

SEQUENCE LISTING

<110> Japan Science and Technology Corporation

<120> Plant Thermogenic Genes and Proteins

<150> JP11-167439

<151> 1999-06-14

<160> 4

<170> PatentIn Ver. 2.0

<210> 1

<211> 1525

<212> DNA

<213> *Symplocarpus foetidus*

<220>

<221> CDS

<222> (280).. (1188)

<221> poly A site

<221> (1271).. (1276)

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<301> Ito, K.

<302> Isolation of two distinct cold-inducible cDNAs encoding plant uncoupling proteins from the spadix of skunk cabbage (*Symplocarpus foetidus*)

<303> Plant Sci.

<304> 149

<305>

<306> 167-173

<307> 1999

<308> GenBank AB024733

<309> 2000-02-25

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 cttccacccc cacccaatcg ccttccggtt cccgaaatat ttctcttccc ttctcccttt 180
 tcttctctac ataaacccta accaccccat cctctcttcc cgcttccgac caccctgcat 240
 tctactggga gcccatitga tgcaggtttc ccggcgagg atg ggc gat cac ggc 294

Met Gly Asp His Gly

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ccg agg acc gag atc tcg ttt gcc ggc agt tcg cga gca gca ttc gcc 342
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15

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gct tgc ttc gcc gag ctt tgc acg att ccg ttg gac act gct aaa gtt 390
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agg ctt caa ctc caa aag aaa gca gta aca ggt gat gtg gtg gct ttg 438
 Arg Leu Gln Leu Gln Lys Lys Ala Val Thr Gly Asp Val Val Ala Leu

40

45

50

cca aaa tac agg gga atg ttg ggc act gtt gcc act att gcc agg gag 486
 Pro Lys Tyr Arg Gly Met Leu Gly Thr Val Ala Thr Ile Ala Arg Glu

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65

gaa ggt ttg tcg gca ctc tgg aaa gga att gta ccc ggt ttg cat cgt 534
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75

80

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caa tgc ctc ttt gga ggg cta cga att ggg ttg tat gaa cca gtt aag 582
 Gln Cys Leu Phe Gly Gly Leu Arg Ile Gly Leu Tyr Glu Pro Val Lys

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95

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tcc ttt tat gtt gga gat aac ttt gtt gga gat att cct tta tcc aag 630
 Ser Phe Tyr Val Gly Asp Asn Phe Val Gly Asp Ile Pro Leu Ser Lys

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110

115

aaa ata ctt gct ggg ctt aca aca ggt gca tta gca att ata gtg gca 678
 Lys Ile Leu Ala Gly Leu Thr Thr Gly Ala Leu Ala Ile Ile Val Ala
 120 125 130
 aat ccc act gac ctt gtt aaa gtt cga ctt caa tct gaa ggt aaa ctc 726
 Asn Pro Thr Asp Leu Val Lys Val Arg Leu Gln Ser Glu Gly Lys Leu
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 ccc cct ggg gta ccg aga cgt tat tca ggg gcg cta aat gct tat tca 774
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 Pro Asn Ile Ala Arg Asn Ala Ile Ile Asn Ala Ala Glu Leu Ala Ser
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 Tyr Asp Gln Val Lys Gln Thr Ile Leu Lys Leu Pro Gly Phe Ser Asp
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 Asn Ile Phe Thr His Ile Leu Ala Gly Leu Gly Ala Gly Phe Phe Ala
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 gtc tgt atc ggt tct cct gtt gat gtg atg aag tct aga atg atg gga 1014
 Val Cys Ile Gly Ser Pro Val Asp Val Met Lys Ser Arg Met Met Gly
 230 235 240 245
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<213> *Symplocarpus foetidus*

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Thr Leu Glu Gln Val Lys Lys Phe Phe Ile Lys Glu Val Pro Asn

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<212> DNA

<213> *Symplocarpus foetidus*

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<222> (286).. (1089)

<221> poly A site

<222> (1171) (1176)

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<301> Ito, K.

<302> Isolation of two distinct cold-inducible cDNAs encoding plant uncoupling proteins from the spadix of skunk cabbage (*Symplocarpus foetidus*)

<303> Plant Sci.

<304> 149

<305>

<306> 167-173

<307> 1999

<308> GenBank AB024734

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Met Gly Asp His

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5 10 15 20

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25 30 35

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 Val Arg Leu Gln Leu Gln Lys Lys Ala Val Thr Gly Asp Val Val Ala

40 45 50

ttg cca aaa tac agg gga atg ttg ggc act gtt gcc act att gcc agg 489
 Leu Pro Lys Tyr Arg Gly Met Leu Gly Thr Val Ala Thr Ile Ala Arg

55 60 65

gag gaa ggt ttg tcg gca ctc tgg aaa gga att gta ccc ggt ttg cat 537
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70 75 80

cgt caa tgc ctc ttt gga ggg cta cga att ggg ttg tat gaa cca gtt 585
 Arg Gln Cys Leu Phe Gly Gly Leu Arg Ile Gly Leu Tyr Glu Pro Val

85 90 95 100

aag tcc ttt tat gtt gga gat aac ttt gtt gga gat att cct tta tcc 633
 Lys Ser Phe Tyr Val Gly Asp Asn Phe Val Gly Asp Ile Pro Leu Ser

105 110 115

aag aaa ata ctt gct ggg ctt aca aca ggt gca tta gca att ata gtg 681
 Lys Lys Ile Leu Ala Gly Leu Thr Thr Gly Ala Leu Ala Ile Ile Val

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| gca aat ccg act gac ctt gtt aaa gtt cga ctt caa tct gaa ggt aaa | | | 729 |
| Ala Asn Pro Thr Asp Leu Val Lys Val Arg Leu Gln Ser Glu Gly Lys | | | |
| 135 | 140 | 145 | |
| ctc ccc cct ggg gta cca aga cgt tat tca ggg gcg cta aat gct tat | | | 777 |
| Leu Pro Pro Gly Val Pro Arg Arg Tyr Ser Gly Ala Leu Asn Ala Tyr | | | |
| 150 | 155 | 160 | |
| tca acc ata gtc aaa aag gaa gga ctt ggt gct ctg tgg act ggg ctt | | | 825 |
| Ser Thr Ile Val Lys Lys Glu Gly Leu Gly Ala Leu Trp Thr Gly Leu | | | |
| 165 | 170 | 175 | 180 |
| ggt cct aat att gcc cgc aat gct att ata aat gct gct gaa ttg gcc | | | 873 |
| Gly Pro Asn Ile Ala Arg Asn Ala Ile Ile Asn Ala Ala Glu Leu Ala | | | |
| 185 | 190 | 195 | |
| agt tat gat caa gtg aaa cag atg aag tct aga atg atg gga gat tca | | | 921 |
| Ser Tyr Asp Gln Val Lys Gln Met Lys Ser Arg Met Met Gly Asp Ser | | | |
| 200 | 205 | 210 | |
| gcc tac aaa agc aca ttt gat tgt ttc atc aag acg ttg aaa aat gat | | | 969 |
| Ala Tyr Lys Ser Thr Phe Asp Cys Phe Ile Lys Thr Leu Lys Asn Asp | | | |
| 215 | 220 | 225 | |
| ggg cct ctt gct ttt tac aag ggg ttt atc cca aac ttt ggt cgg tta | | | 1017 |
| Gly Pro Leu Ala Phe Tyr Lys Gly Phe Ile Pro Asn Phe Gly Arg Leu | | | |
| 230 | 235 | 240 | |
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| 245 | 250 | 255 | 260 |
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<212> PRT

<213> *Symplocarpus foetidus*

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| 1 | | | | 5 | | | | 10 | | | | | 15 | | |
| Arg | Ala | Ala | Phe | Ala | Ala | Cys | Phe | Ala | Glu | Leu | Cys | Thr | Ile | Pro | Leu |
| | | | | 20 | | | | 25 | | | | | 30 | | |
| Asp | Thr | Ala | Lys | Val | Arg | Leu | Gln | Leu | Gln | Lys | Lys | Ala | Val | Thr | Gly |
| | | | | 35 | | | | 40 | | | | | 45 | | |
| Asp | Val | Val | Ala | Leu | Pro | Lys | Tyr | Arg | Gly | Met | Leu | Gly | Thr | Val | Ala |
| | | | | 50 | | | | 55 | | | | | 60 | | |
| Thr | Ile | Ala | Arg | Glu | Glu | Gly | Leu | Ser | Ala | Leu | Trp | Lys | Gly | Ile | Val |
| | | | | 65 | | | | 70 | | | | | 75 | | 80 |
| Pro | Gly | Leu | His | Arg | Gln | Cys | Leu | Phe | Gly | Gly | Leu | Arg | Ile | Gly | Leu |
| | | | | 85 | | | | 90 | | | | | 95 | | |
| Tyr | Glu | Pro | Val | Lys | Ser | Phe | Tyr | Val | Gly | Asp | Asn | Phe | Val | Gly | Asp |
| | | | | 100 | | | | 105 | | | | | 110 | | |
| Ile | Pro | Leu | Ser | Lys | Lys | Ile | Leu | Ala | Gly | Leu | Thr | Thr | Gly | Ala | Leu |
| | | | | 115 | | | | 120 | | | | | 125 | | |
| Ala | Ile | Ile | Val | Ala | Asn | Pro | Thr | Asp | Leu | Val | Lys | Val | Arg | Leu | Gln |
| | | | | 130 | | | | 135 | | | | | 140 | | |

Ser Glu Gly Lys Leu Pro Pro Gly Val Pro Arg Arg Tyr Ser Gly Ala
145 150 155 160
Leu Asn Ala Tyr Ser Thr Ile Val Lys Lys Glu Gly Leu Gly Ala Leu
 165 170 175
Trp Thr Gly Leu Gly Pro Asn Ile Ala Arg Asn Ala Ile Ile Asn Ala
 180 185 190
Ala Glu Leu Ala Ser Tyr Asp Gln Val Lys Gln Met Lys Ser Arg Met
 195 200 205
Met Gly Asp Ser Ala Tyr Lys Ser Thr Phe Asp Cys Phe Ile Lys Thr
 210 215 220
Leu Lys Asn Asp Gly Pro Leu Ala Phe Tyr Lys Gly Phe Ile Pro Asn
225 230 235 240
Phe Gly Arg Leu Gly Ser Trp Asn Val Ile Met Phe Leu Thr Leu Glu
 245 250 255
Gln Val Lys Lys Phe Phe Ile Lys Glu Val Pro Asn
 260 265